

towards the posterior end, which is thickened and rugose. The anterior annulations are armed with two fascicles of yellow bristles, of about three or four each, placed opposite to each other: the rest of the rings have about two each; but the numbers vary. Colour pale orange-red, the mouth with a purple cast. Buccal cirri twenty, ten on each side of the oral organ, white, beautifully maculated with oblong spots of orange-red down the centre. Dorsal cirri reflexed, purple, with a faint reddish tinge.

Length of the worm 2 inches, of the tube 3 inches; diameter at larger or anterior end 2 lines.

This species constructs a rather flexuose tube made of a thin horny substance similar to that of the polypidoms of the Sertularias, and coated with grains of sand and comminuted shells, with bits of corallines attached.

The worm is able to raise its head considerably above the first or anterior ring, bearing the dorsal cirri, as shown in the figure (Plate I.) on the right. Generally speaking, its movements were slow; but when fully protruded it is a beautiful creature, the dorsal cirri contrast so strongly with the delicately painted buccal organs. I kept it alive for several days, and I found that it seldom protruded itself by day; but as evening closed in it would then develop itself to its fullest extent.

I am, Gentlemen,
Yours obediently,
EDWARD PARFITT.

Devon and Exeter Institution,
April 21, 1866.

II.—*On the Affinities of Peridinium Cypripedium, Jas-Clk., and Urocentrum Turbo, Ehr.* By Prof. H. JAMES-CLARK, A.B., B.S., Soc. Am. Acad.

In the 'Proceedings of the American Academy' of February 1865 I published a paper on the anatomy and physiology of *Peridinium Cypripedium*, mihi. That article, with the accompanying plate, was copied into the 'Annals and Magazine of Natural History' for October 1865. In the December Number of the same 'Annals' I find some remarks on my paper by Mr. H. J. Carter, the principal aim of which is to show that the animal which I have described is not a *Peridinium* but a *Urocentrum*. I wish, through the medium of your Magazine, to give my reasons why I did not formerly, and do not now, believe that the identification of that gentleman can be sustained.

Let me state, in the first place, that the whole question hinges on the identification of the animal as described and figured by

Ehrenberg, and in no way is dependent upon the affidavit of Claparède and Lachmann. The latter can lay no greater claim to correctness than Mr. Carter in this respect; and all are equally liable to a misapprehension of the nature of the infusorian as described by Ehrenberg. The fact that the authors of the 'Études' found the animal in question, as they think, in Berlin, as it were under the very eyes of Ehrenberg, renders the identification no more certain than the discovery of the same by Mr. Carter, as he thinks, far off in England.

I cannot help deprecating the confidence with which Mr. Carter pronounces upon what he calls my mistake, seeing that his judgment is based upon a description at second-hand, as I infer from his quotation of Ehrenberg's statements from the 'Micrographic Dictionary.' The basis for an identification is meagre enough in the work of the Berlin micrographer; and how much less satisfactory in the Dictionary of Griffith and Henfrey, every one knows who has compared the two books. Messrs. Claparède and Lachmann frequently find occasion to deplore the unsatisfactory character of the descriptions and figures of Ehrenberg; but if they never had cause to complain before, it must have occurred when they attempted to decipher the illustrations of *Urocentrum* on plate 24 of the 'Infusions-thierchen.' For my own part, I felt the same restraint when originally working up my article; and Mr. Carter must pardon me therefore when I say that I cannot see the necessity or the proper basis for his *ex cathedra*, even though he may swear upon the original work itself. I am, however, far from attributing to your distinguished authority upon the group of Protozoa the singular fancy, possessed by some, for deciphering the obscure two-line descriptions of the old-time species-makers; still less would I suppose him capable of that remarkable mania for identifying such zoological vagaries as those of Rafinesque with this or that animal simply because it came from the same locality as that named by that singular enthusiast.

Since, however, Mr. Carter has so positively pronounced upon this matter, I am compelled to assume the figures and description of Ehrenberg to stand in the place of the animal itself, and not what others may happen to think it ought to be. Ehrenberg says, in his generic diagnosis of *Urocentrum*, "corpore non ciliato, fronte ciliis coronata." Now in *Peridinium Cypripedium* all of the body (excepting the broader end, which is occupied by the *pseudo-cuirass*) is covered with cilia, and there is no such thing as a *corona* of cilia upon it. The anterior and posterior transverse annular furrows seem to be bands of *vibrating cilia* simply because these cilia are only rather more crowded along the edges of the furrows than elsewhere. The mouth of *Uro-*

centrum is stated to be at the anterior edge of the ventral face: "Fig. 1 von der Seite gesehen, Bauchfläche rechts mit dem Munde am vorderen Rande." In *Peridinium Cypripedium* this aperture is on the ventral side and about halfway between the two ends of the body—a position which it seems to occupy in many of the Peridiniæa.

Although I do not use the word *spiral* in regard to the mouth and œsophagus, it can hardly be said that I "mention nothing spiral" about them; for I think that the illustrations tell as much as the text; and any one who will inspect my figures 2 & 3 will see that the position of the mouth in the first, and the trend and curve of the œsophagus in the second, are sufficiently indicative of a spiral arrangement of these parts. The text fully bears out this assertion, in the following words (p. 397; Annals, p. 274):—"The mouth lies altogether within the posterior obliquely transverse furrow (*pf*), and extends from its anterior to its posterior edge, trending diagonally across the axial plane of the body, from the right, backwards, towards the left;" and on p. 398 (Annals p. 275), "From the mouth the œsophagus (*œ*) passes obliquely backwards and towards the dorsal region, at least halfway through the body, and then terminates rather abruptly just before the contractile vesicle, but a little to the right side (fig. 3 *œ*) of the axial plane." Lest, however, there should be any further doubt in regard to my views upon this point, I will state now that the arrangement of the mouth and œsophagus is decidedly spiral, and unequivocally stamps this animal as a member of the læotropic division of Infusoria Ciliata.

As to the systematic position of this *Peridinium*, its læotropic character at once removes it out of the division to which the Vorticellina belong; but yet when we see that one of the latter family, viz. *Trichodina Pediculus*, Ehr., has its contractile vesicle on the left side of the body, instead of on the right—thus partially reversing the relationship of the organs as exhibited in the other members of that group (see my paper in the Mem. Boston Soc. Nat. Hist. vol. i. 1866), and that it totally lacks the protrusile vibratory disk, so eminently characteristic of the Vorticellidæ—and when, again, we call to mind the ciliated body of another Vorticellidan, viz. Claparède's *Trichodinopsis*, the way appears clear for the close approximation to the Vorticellina of the totally ciliated Tintinnoidea with their terminal, depressed, cyathiform front, bordered by the crown of cilia, which terminates, according to Claparède, by passing into the excentric mouth: and then, as a succeeding step, it does not seem at all improbable that the Peridiniæa, judging from the characters of *P. Cypripedium*, should have a not very remote affiliation with

the same group that the Tintinnoidea border upon. The apparently low organization of some of the Peridiniæ does not invalidate their approximation, through the higher forms, to the Tintinnoidea, any more than the inferior organization of the Cyclopidæ depresses the whole class of Crustacea below the level of the group of worms.

In this connexion I would mention that I do not believe that the so-called Cilio-Flagellata are distinct, as an order, from the Flagellata. I will not deny that the former, as well as the latter, have more intimate relations among themselves than exists between the two groups; but at the same time there are some (as, for instance, *Prorocentrum*) among the Cilio-Flagellata which hold their position there by a quite doubtful tenure—the few cilia at the anterior end indicating merely a preponderance in favour of their affiliation with that group, rather than a positive claim to be so united. The lorica gives to *Prorocentrum* the habit of a Peridinian, and may add a little to the strength of the argument which the cilia afford; but, on the other hand, there is a new genus of Infusoria which I have described in a recent work* under the name of *Heteromastix* (*H. proteiformis*), which possesses all the habits, actions, mode of progression, and general appearance of a true flagellate infusorian, very much like a *Heteromita*, Duj., and is endowed with two anteriorly subterminal flagella—the one acting as a proboscis or tentacular organ, and the other as a trailer or moveable keel; but at the same time the ventral anterior half of the body is hollowed out by a broad median furrow, which is thickly lined with locomotive cilia—thus presenting a peculiarity not heretofore deemed admissible as a characteristic of Flagellata, but, on the contrary, as appertaining alone to the Cilio-Flagellata.

I would remark here, moreover, that in view of the fact that *Peridinium Cypripedium* possesses, beside the median transverse sulcation, an anterior annular furrow, and immediately in front of it a low skullcap-like covering, or *pseudo-cuirass* (both of which Mr. Carter appears to have been inattentive to in perusing my article), it seems possible that this infusorian may turn out to be generically different from any other Peridinian described hitherto. This looks so highly probable that I will propose the name *Peridinopsis* for it.

Since my commentator has gone so far as to doubt even the specific diversity of these two infusorians, I would add, in regard to the species *Urocentrum Turbo*, that Ehrenberg describes and

* 'Mind in Nature,' by H. James-Clark, pp. 330, with over two hundred illustrations. New York, 1866.

figures it as having an ovate three-cornered body, "corpore ovato triquetro," and states that the *stylus* or tail equals one-third the length of the body, "stilo tertiam corporis partem æquante;" whereas the American *Peridinium* has an "oblique pyriform outline," and the so-called flagellum is at least half as long as the body.

Between the statements of Ehrenberg and Claparède there is such a marked discrepancy that I am pretty well convinced that the testimony of the latter cannot by any means be used as an adjunct to the description of the former; for whilst Ehrenberg speaks of the "corpore non ciliato, fronte ciliis coronata," Claparède states (p. 76), in the first place, that there are no other organs than the buccal cirri, but that (p. 135) "it is the inferior part of the [*transverse median*] furrow that carries the buccal cirri;" and secondly, that "the mouth is not placed where Ehrenberg figures it [*i. e.* at the anterior edge of the ventral plane], but is lodged in the transverse median furrow which that author represents."

Supposing, now, the animal of Ehrenberg to be the same as that of Claparède, and the one described by me likewise identical with the former, then we must believe that Claparède has committed a great oversight in not seeing the most prominent and conspicuous cilia, in the region of the anterior annular furrow, as described by me, and which, in this assumed case, are in a corresponding position with the vibrating cilia-crown about the anterior, flat, frontal plane ("um die vordere flache Stirnfläche einem wirbelnden Wimperkranz") which Ehrenberg describes. It hardly seems possible that Claparède should have detected the smaller cilia in the median transverse furrow and overlooked the larger and more conspicuous ones, whilst Ehrenberg, with his far less powerful lenses, appeared to find no difficulty in making out the latter. It seems therefore much more plausible that the *Urocentrum* of Ehrenberg is not the same as that of Claparède, and certainly more likely that the latter should have failed to appreciate the value of the observations of the former upon the anterior cilia-crown than that he should have overlooked it were it really present.

I scarcely need add, therefore, that I am at least equally confident, if not fully satisfied, that *Peridinium Cypridium* is not the same as the *Urocentrum* of Claparède.

Cambridge, Mass., May 12, 1866.